

Name: _____

at1124exam: Radicals and Squares (v814)

Question 1

Simplify the radical expressions.

$$\sqrt{8}$$

$$\sqrt{45}$$

$$\sqrt{18}$$

$$\frac{\sqrt{2 \cdot 2 \cdot 2}}{2\sqrt{2}}$$

$$\frac{\sqrt{3 \cdot 3 \cdot 5}}{3\sqrt{5}}$$

$$\frac{\sqrt{3 \cdot 3 \cdot 2}}{3\sqrt{2}}$$

Question 2

Find all solutions to the equation below:

$$\frac{(x-8)^2 - 9}{2} = 20$$

First, multiply both sides by 2.

$$(x-8)^2 - 9 = 40$$

Then, add 9 to both sides.

$$(x-8)^2 = 49$$

Undo the squaring. Remember the plus-minus symbol.

$$x - 8 = \pm 7$$

Add 8 to both sides.

$$x = 8 \pm 7$$

So the two solutions are $x = 15$ and $x = 1$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 + 14x = 95$$

$$x^2 + 14x + 49 = 95 + 49$$

$$x^2 + 14x + 49 = 144$$

$$(x + 7)^2 = 144$$

$$x + 7 = \pm 12$$

$$x = -7 \pm 12$$

$$x = 5 \quad \text{or} \quad x = -19$$

Question 4

A quadratic polynomial function is shown below in standard form.

$$y = 3x^2 + 36x + 100$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 3 .

$$y = 3(x^2 + 12x) + 100$$

We want a perfect square. Halve 12 and square the result to get 36 . Add and subtract that value inside the parentheses.

$$y = 3(x^2 + 12x + 36 - 36) + 100$$

Factor the perfect-square trinomial.

$$y = 3((x + 6)^2 - 36) + 100$$

Distribute the 3.

$$y = 3(x + 6)^2 - 108 + 100$$

Combine the constants to get **vertex form**:

$$y = 3(x + 6)^2 - 8$$

The vertex is at point $(-6, -8)$.